



Steroid intra-articular injections for foot and ankle conditions: How effective are they?

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The Foot and Ankle Online Journal 9 (2): 7

Purpose: Intra-articular steroid injection is commonly given for the non-operative management of foot and ankle arthritis; however, there is little evidence in the literature about the effectiveness of these injections. The aim of our study was to assess the effectiveness of injections given for the treatment of foot and ankle arthritis.

Methods: We retrospectively reviewed the prospectively collected data of 64 foot and ankle injections done over a period of 12 months. 0.5% Chirocaine and 40 mg of Kenalog was used for the injection. A visual analogue score was used to determine the efficacy of the injection.

Results: The mean follow up was 12 months. 84% (54/64) patients had significant pain relief following the foot and ankle injection. 16% (10/64) went on to have further procedures at six months. There were 6 patients with ankle arthritis in whom the injection effect did not last more than six months. Two had arthroscopic debridement, two had fusion and of the remaining two patients, one was not fit for surgery and the last one declined surgical intervention. Additionally at six months there were two patients with midfoot OA and two with hindfoot OA, who required further procedures. Patients with no remaining symptoms were either discharged or given an open appointment.

Conclusions: Our study has shown that patients receiving an intra-articular steroid injection for forefoot conditions have positive outcomes following the injection for six months. Whereas 22% of patients having an intra-articular steroid injection for the ankle, hindfoot and midfoot arthritis have failed to maintain the symptom relief at six months and required further intervention. This information is useful when obtaining an informed consent from the patient receiving an intra-articular injection for foot and ankle conditions.

Key words: steroid injections, arthritis, intra-articular injection, foot, ankle

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Intra-articular injections into foot and ankle joints are used for therapeutic and diagnostic purposes. Injection of local anaesthetic may provide temporary relief of pain and suggests the joint as the source of symptoms; inclusion of a corticosteroid in the injection may diminish inflammation from various causes to alleviate pain [1] Mitchell et al. reported selective intra-articular injections afford a direct method of confirming the site of hindfoot pain and may aid in surgical planning [2].

Osteoarthritis (OA) is the most common form of joint disease and a leading cause of disability in the elderly. The etiology is multi-factorial, with a variety of risk factors such as aging, genetics, trauma, malalignment, and obesity, which interact to cause this disorder [3]. Foot and ankle arthritis can cause substantial pain and functional limitation and intra-articular corticosteroids are commonly used as a non-operative treatment for pain relief [4].

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Intra-articular corticosteroids have previously been shown to offer good pain relief in patients with knee, hip or shoulder OA; however there is little evidence in the literature about the effectiveness of foot and ankle injections [5-8]. The aim of this study is to evaluate the efficacy of intra-articular corticosteroid injection in patients with Foot and ankle OA.

Materials and Methods

We performed a retrospective review of prospectively collected data of 64 patients who had foot and ankle injections between July 2013 to June 2014. The most common indication for injection was osteoarthritis of the joint involved. Each patient was evaluated clinically and radiologically by the Senior Author (DS) to determine the need for the intra-articular injection. We also recorded age, sex, diagnosis, symptoms duration and any relevant co-morbidities.

0.5% Chirocaine and 40 mg of Kenalog (Triamcinolone) was used for the injections. All the injections were performed by the Senior Author (Foot & Ankle Consultant) in the operative theatre using Image Intensifier guidance. Patients were then seen at 12 weeks and six months. Based on their symptoms at six months, patients either had further procedures, discharged or given an open appointment. The primary efficacy outcomes were a reduction in global pain. A 0–10 Visual Analog Scale (VAS) was used for global pain measurement. VAS was recorded along the different visits (Figure 1).

Injection site	Number of patient	Joints involved
Ankle	28/64 (44%)	Ankle joint (28)
Hindfoot	10/64 (16%)	Talonavicular (7), Calcaneocuboid (3)
Midfoot	10/64 (16%)	Tarsometatarsal (10)
Forefoot	16/64 (28%)	Metatarsophalangeal (11) Interphalangeal joints (5)

Table 1 Demonstrating the number of patient in each group arranged by injection site location.

Results

Sixty four patients were studied: twenty four males and forty females. The average age was fifty four years (range 37 to 79 yrs). Mean follow up was 12 months. Patients had mean duration of symptoms of three years (range one to five years). Patients were put into four groups, according to the site of the injections (Table 1).

The initial VAS average was nine, with a range from six to 10. 84% (54/64) of patients had significant pain relief following the foot and ankle injection with a VAS below five that lasted more than six months. In 16% (10/64) of the patient's symptoms remained and they went on to have further intervention (surgery/arthroscopy) (Table 2).

Pre op pain score	average 9 (6-10)
Post op pain score	84% <5 average 3 16% >5 average 8

Table 2 Overall pain score; pre and post injections.

0–10 Numeric Pain Rating Scale

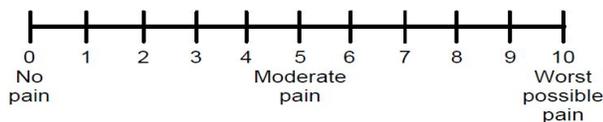


Figure 1 Visual analogue score

Injection site (No of pts)	VAS pre-inj Mean (range)	VAS at 12 weeks Mean (range)	Patients had more injections	VAS at 6 months Mean (range)	Patients needed further Procedure
Ankle joint 28	8 (6-10)	5 (3-9)	5 patients	6 (4-10)	6 patients 5 had inj at 6 months+ 1 new)
Hind-foot 10	9 (8-10)	4 (0-8)	3 patients	6 (4-8)	2 patient (both had inj at 6 months)
Mid –foot 10	9 (7-10)	3 (3-5)	1 patients	5 (3-10)	2 patients (1 had inj at 6 months)
Fore-foot 16	9 (8-10)	3 (0-4)	none	3 (0-5) 4 did not attend	None

Table 3 Pre and post injections VAS

At 12 weeks; the injections failed to provide pain relief in nine patients and they all were provided further injections. At six months; eight out of those nine patients continued to have symptoms after the second injections and required surgical interventions. Additionally there were two patients who had one injection initially and presented after six months with worsening symptoms (Table 3).

There were six patients with ankle arthritis in whom the injection effect did not last more than six months. Two had arthroscopic debridement, two had fusions (Figures 2 and 3), one was not fit for surgery and the last one declined it. Additionally at 6 months 2 patients with midfoot OA and two with hindfoot OA, who required further intervention (Table 4).

Age	sex	Duration of symptoms Months	Co-morbidities	Investigation	Diagnosis	Pre inj VAS	12 weeks post inj VAS	6 mo VAS	More injections	Further surgery?
48	F	18	RA	MRI	2, 3 rd TMTJ Arthritis	10	06	10	No	Fusion
49	F	24	None	X rays	Ankle OA	10	09	09	No	Arthroscopic Debridement
60	M	60	Pilon Fracture	CT X rays	Ankle OA Post-traum atic	10	03	10	No	Fusion
70	F	48	None	CT	2, 3 rd TMTJ Arthritis	10	05	10	No	Fusion
79	M	120	Cardiac problems	X rays	Ankle OA	08	10	10	No	Not fit for surgery
39	M	36	Calcaneus fracture	CT X rays	Subtalar OA	09	09	09	No	Fusion
54	F	30	None	X rays	Ankle OA	10	08	10	No	Arthroscopic Debridement
67	M	60	None	X rays	Talo-Nav, Calc-Cub OA	08	06	08	No	Fusion
63	M	36	Hip OA	X rays	Ankle OA	08	08	08	No	Declined surgery
72	M	36	None	CT X rays	Ankle OA	10	03	10	No	Fusion

Table 4 Patients who required further intervention at six months post injection.



Figure 2 Second and third tarsometatarsal joint fusion.

Discussion

Cortisone was first used in the treatment of rheumatoid arthritis in the late 1940s [3] and in 1950; Thorn was the first to inject steroids into the knee of a patient with rheumatoid arthritis [4]. In the beginning, the results were somewhat disappointing, however, it later became clear that cortisone is dependent for its action on hydroxylation to hydrocortisone in the liver. Direct injection of hydrocortisone gave better results, but the effect was only transient. The development of less soluble esters provided steroids with longer half-lives and long term effectiveness [5]. The rate of systemic absorption of an intra-articular corticosteroid is related to the solubility of the compound, and it is understood that more insoluble corticosteroid compounds are better suited to intra-articular use as the local duration of action may be prolonged and effects due to systemic absorption are kept to a minimum [6]. Triamcinolone Acetonide (Kenalog) has an extended duration of effect which may be sustained over a period of several weeks and for reasons related to availability and cost, as well as pharmacokinetics, was the steroid used in this clinical investigation.

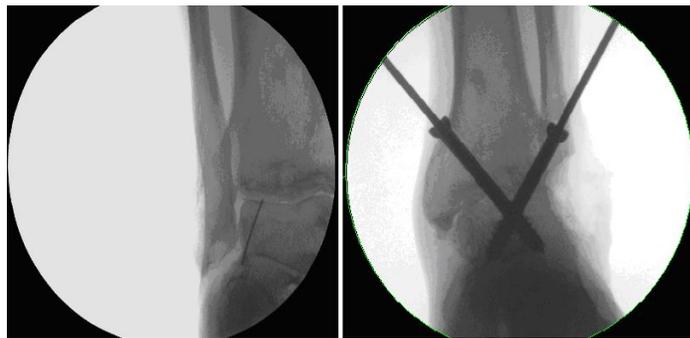


Figure 3 Ankle OA intraoperatively during fusion procedure.

Intra-articular corticosteroids remain widely used for symptomatic treatment of peripheral joint osteoarthritis, although the duration of the effect can be highly variable depending on many factors, such as type of joint involved and the use of image guidance or not [7-11].

Kevin et al suggest experienced surgeons may be able to place intra-articular injections without fluoroscopy in a normal posterior subtalar joint with a 97% accuracy rate [1]. Fluoroscopy may not be necessary for injections used solely for therapeutic purposes. However, if the injection is intended for diagnostic purposes and surgical decision making for potential arthrodesis or if the joint is abnormal, they recommend fluoroscopy to ensure accurate placement without extension or extravasations into nearby structures that also might be potential sources of pain. Concerns for surrounding soft tissues may warrant use of fluoroscopy in cases of arthrosis and indwelling hardware [1]. Similarly Khoury et al. reported injections performed under fluoroscopic control allowed confirmation of the painful joint, which in turn led to successful patient outcomes after arthrodesis [12]. All our patients had the intra-articular steroid injection under fluoroscopy guidance as suggested in the literature to improve the accuracy of the injections.

Ward et al in a prospective one year follow up of intra-articular steroid injection of the foot and ankle has shown a statistically significant foot and ankle score improvement following corticosteroid injection up to and including six months post-injection. No independent clinical factors were identified that could predict a better post-injection response.

The magnitude of the response at two months was found to predict a sustained response at nine months and one year. Intra-articular corticosteroids improved symptom scores in patients with foot and ankle arthritis. The duration of this response was varied and patient factors affecting the response remain unclear. Response to the injection at two months can be used to predict the duration of beneficial effects up to at least one year [13].

In our study, there was a statistically significant improvement in foot and ankle scores above the starting point using the visual analogue score. 84% (54/64) of the patients had an appreciable pain relief up to six months post injection. Only 16% (10/84) of the patients needed further procedures at six months and in the majority of them. At 12 weeks; the injections failed to provide pain relief in nine patients and they all were provided further injections. At six months; eight out of those nine patients continued to have symptoms after the second injections and required surgical interventions. Similar to Ward et al findings our study has shown a similar result in a poor outcome at 12 weeks correlates well with the long term outcome resulting in further injection or surgical intervention.

Furthermore, our study has shown that patients having forefoot injections had a good outcome with none of them requiring surgical intervention at one year. Whereas the ankle, hindfoot and midfoot injections had a failure rate of 22% resulting in surgical intervention. There is no evidence in the literature of the failure rate of the injections and the percentage of patients requiring surgical intervention for the injection failure. Our study is the first one to show that failure rate for the different regions of the foot and ankle over a one year period.

The above evidence would be a useful tool when it comes to obtaining informed consent for patients having foot and ankle injections.

This study was limited by a number of weaknesses. Our sample size, although sufficient to identify statistically significant differences for some of the factors that we measured, was possibly too small for us to detect other statistically significant factors, should they have presented.

We assumed that the joints identified by the foot and ankle surgeon as the source of symptoms, in fact, were the cause of our patients' foot pain. If this diagnosis was inaccurate, or if other unidentified joints or pathology were contributing to the participant's symptoms, this would have biased our results toward the null.

Conclusion

Our study has shown that patients having intra-articular steroid injection for forefoot conditions have good outcome following the injection and they maintain it at six months. Whereas approximately 22% of patients receiving intra-articular steroid injection for arthritis of the ankle, hindfoot or midfoot, have failed to remain free of symptom at six months and required further intervention. This information is useful when obtaining an informed consent from the patient receiving an intra-articular injection for foot and ankle conditions, in order to provide them with realistic expectations for treatment.

References

1. Kirk KL, Campbell JT, Guyton GP, Schon LC. Accuracy of posterior subtalar joint injection without fluoroscopy. *Clin Orthop Relat Res.* 2008;466(11):2856-60.
2. Mitchell MJ, Bielecki D, Bergman AG, Kursunoglu-brahme S, Sartoris DJ, Resnick D. Localization of specific joint causing hindfoot pain: value of injecting local anesthetics into individual joints during arthrography. *AJR Am J Roentgenol.* 1995;164(6):1473-6.
3. Hench PS, Slocumb CH. The effects of the adrenal cortical hormone 17-hydroxy-11-dehydrocorticosterone (Compound E) on the acute phase of rheumatic fever; preliminary report. *Proc Staff Meet Mayo Clin.* 1949;24(11):277-97.
4. Hollander JL. Intra-articular hydrocortisone in arthritis and allied conditions; a summary of two years' clinical experience. *J Bone Joint Surg Am.* 1953;35-A(4):983-90.
5. Grillet B, Dequeker J. Intra-articular steroid injection. A risk-benefit assessment. *Drug Saf.* 1990;5(3):205-11.
6. Derendorf H, Möllmann H, Grüner A, Haack D, Gyselby G. Pharmacokinetics and pharmacodynamics of glucocorticoid suspensions after intra-articular administration. *Clin Pharmacol Ther.* 1986;39(3):313-7.
7. D'agostino MA, Ayrat X, Baron G, Ravaud P, Breban M, Dougados M. Impact of ultrasound imaging on local corticosteroid injections of symptomatic ankle, hind-, and mid-foot in chronic inflammatory diseases. *Arthritis Rheum.* 2005;53(2):284-92.

8. Peterson CK, Buck F, Pfirrmann CW, Zanetti M, Hodler J. Fluoroscopically guided diagnostic and therapeutic injections into foot articulations: report of short-term patient responses and comparison of outcomes between various injection sites. *AJR Am J Roentgenol.* 2011;197(4):949-53.
9. Friedman DM, Moore ME. The efficacy of intraarticular steroids in osteoarthritis: a double-blind study. *J Rheumatol.* 1980;7(6):850-6.
10. Gaffney K, Ledingham J, Perry JD. Intra-articular triamcinolone hexacetonide in knee osteoarthritis: factors influencing the clinical response. *Ann Rheum Dis* 1995;54:379-81.
11. Dieppe P, Cushnaghan J, Jasani MK, McCrae F, Watt I. A two-year, placebo-controlled trial of non-steroidal anti-inflammatory therapy in osteoarthritis of the knee joint. *Br J Rheumatol* 1993;32(7):595-600.
12. Khoury NJ, el-Khoury GY, Saltzman CL, Brandser EA. Intraarticular foot and ankle injections to identify source of pain before arthrodesis. *AJR Am J Roentgenol.* 1996;167:669-673.
13. Ward ST, Williams PL, Purkayastha S. Intra-articular corticosteroid injections in the foot and ankle: a prospective 1-year follow-up investigation. *J Foot Ankle Surg.* 2008;47(2):138-44.
14. Kumar N, Newman RJ. Complications of intra- and peri-articular steroid injections. *Br J Gen Pract.* 1999;49(443):465-6.